19th: Burlington, Vermont, aurora of faint green color observed from 10:00 to 11:45 p. m. New Corydon, Indiana, aurora consisting of white segment and small arch, extending to an altitude of 15°, was observed from 9:00 to 11:00 p. m. Alpena, Michigan, diffuse auroral light observed from 9:00 p. m. to 12:35 a. m. of 20th. Saint Vincent, Minnesota, pale yellow auroral light from 9:00 to 11:30 p. m.

20th: Burlington, Vermont, aurora of faint green color from 10:00 to 11:40 p. m. Swanwick, Illinois, aurora consisting of whitish light over a bank of clouds, observed at 9:00 p. m. Saint Vincent, Minnesota, diffuse yellow auroral light observed from 9:30 to 11:30 p. m. Moorhead, Minnesota, faint aurora of diffuse yellow color.

21st: Burlington, Vermont, aurora of faint green and yellow colors.

23d: Fort Madison, Iowa, aurora during the eveing.

26th: Tobacco Garden, Dakota, faint aurora oserved at 10.20 p. m.

30th: Burlington, Vermont, brilliant auroral display from 10:30 to 11:30 p. m. No arch was visible; bright streamers of pale green were observed.

31st: Burlington, Vermont, from 10:30 to 11:40 p. m., aurora of pale green color. Saint Vincent, Minnesota, auroral arch at 9:00 p. m., of indistinct outlines, reaching an altitude of 30°; beams of pale yellow were observed at intervals. The light of the moon modified the brilliancy of the display.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England: 1st, 3d, 8th, 10th, 13th, 14th, 17th to 22d, 26th to 29th.

Middle Atlantic states: 1st, 4th, 6th, 10th to 14th, 18th to 21st, 26th to 31st.

South Atlantic states: 1st to 5th, 9th, 11th to 14th, 16th to 23d, 25th, 26th, 28th to 31st.

Florida peninsula: 3d to 6th, 8th to 15th, 17th to 21st, 23d to 27th, 29th to 31st.

East Gulf states: 1st to 4th, 8th to 23d, 26th to 31st.

West Gulf states: 2d, 3d, 4th, 7th, 9th to 31st.

Rio Grande valley: 1st, 8th, 9th, 10th, 14th, 17th, 22d, 24th, 30th.

Ohio valley nnd Tennessee: 1st to 5th, 7th, 9th to 14th, 16th to 21st, 26th to 31st.

Lower lake region: 1st, 2d, 10th, 12th to 14th, 16th to 19th, 27th, 28th, 31st.

Upper lake region: 3d, 9th, 11th, 13th, 16th to 18th, 21st, 24th to 27th.

Extreme northwest: 5th to 8th, 12th, 15th, 17th, 22d to 26th, 28th, 29th, 31st.

Upper Mississippi valley: 1st to 4th, 6th, 7th, 9th to 23d, 25th to 31st.

Missouri valley: 1st to 3d, 5th to 9th, 11th, 12th, 14th to 18th, 20th, 22d to 30th.

Northern slope: 1st to 8th, 13th, 14th, 16th to 21st, 23d to 28th, 30th, 31st.

Middle slope: 1st to 8th, 11th, 12th, 14th to 23d, 25th to 29th.

Southern slope: 3d, 4th, 6th to 9th, 11th to 13th, 15th to 21st, 26th, 28th to 30th.

Southern plateau: 1st to 9th, 12th to 29th, 31st.

Middle plateau: 1st to 5th, 7th, 17th to 21st, 23d, 24th, 27th, 30th.

Northern plateau: 3d, 4th, 20th, 22d, 23d, 31st.

North Pacific coast region: 4th, 28th, 31st.

Middle Pacific coast region: 3d, 4th, 18th, 19th, 20th.

South Pacific coast region: 4th, 5th.

During thunder-storms the following instances of damage by lightning have been reported:

Clay Centre, Kansas, 15th: Two men were killed by lightning at 6.00 p. m., about eight miles from station. 28th, house struck by lightning, and one person killed.

Boston, 28th: Two men killed by lightning.

Dodge City, Kansas, 4th: During thunder, a man was killed by lightning in this city.

Roseburg, Oregon, 4th: About twelve miles north of this place, a barn was struck and burned by lightning, together with six horses, farming implements, hay, etc., entailing a loss of $5,000.

Cincinnati, 10th: Two men killed by lightning.

Omaha, 29th: During a heavy thunder-storm, a dwelling in Platte county was struck by lightning; one person was killed, and another severely injured.

Texarkana, Arkansas, 12th: During a severe storm, (see LOCAL STORMS,) much damage was done at this place by lightning.

Pike's Peak, Colorado, 1st: At 4.31 p. m., during a heavy fall of hail, lightning struck the station building near the southeast corner, having following the course of the telegraph wire a distance of several rods. The fluid passed through the outer and petition walls and entered the office near the stove, tearing up the floor, melting and tearing off the zinc-sheathing around the stove. The self-registering attachment of the anemometer was demolished, and also the clock which hung upon the office wall. The office wires and anemometer dial were completely burned up. The explosion was terrific. All the window-glass in the office was broken. The observer and assistant were severely stunned and bruised.

Creswell, Kansas, 17th: Dwelling struck and burned by lightning, four miles northwest of this place.

Umatilla, Oregon, 23d: During a severe sand storm, the air was so charged with electricity that office wires and stove-pipe emitted sparks, and when touched produced a shock.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England: 3d, 16th, 22d, 29th.

Middle Atlantic states: 18th, 22d, 24th, 25th, 26th, 27th, 29th, 31st.

East Gulf states: 7th, 24th, 29th, 30th.

Ohio valley and Tennessee: 6th, 11th, 13th, 16th, 20th, 21st, 25th, 30th.

Lower lake region: 12th, 16th, 31st.

Upper Mississippi valley: 6th, 11th, 19th, 29th.

Missouri valley: 6th, 8th, 9th, 16th, 18th.

Solar halos were also reported from the following stations not included in the districts named above:

Saint Vincent, Minnesota, 16th.
Yates Center, Kansas, 9th.
Hatteras, North Carolina, 16th.
Palestine, Texas, 21st, 29th.
Fort Keogh, Montana, 19th.
Tobacco Garden, Dakota, 5th, 18th, 20th.
Salt Lake City, Utah, 16th.
San Francisco, California, 31st.
Grand Haven, Michigan, 30th.
Riley, Illinois, 6th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England: 3d, 17th, 31st.

Middle Atlantic States: 21st, 23d, to 28th, 31st.

South Atlantic states: 24th, to 29th.

East Gulf States: 22d, 23d, 24th, 26th, 28th, 29th.

West Gulf states: 20th, 23d, 26th, to 30th.

Ohio valley and Tennessee: 2d, 3d, 4th, 7th, 21st, 24th, to 31st.

Lower lake region: 29th, 30th.

Upper lake region: 2d, 24th, 25th, 26th, 28th.

Upper Mississippi valley: 1st, 26th, to 31st.

Missouri valley 1st, 19th, 24th, 26th, 27th.

Extreme northwest: 8th, 11th, 23d, 24th.

Lunar halos were also reported from the following stations not included in the districts named above:

Key West, Florida, 29th.
Terry's Landing, Montana, 26th.
Helena, Montana, 25th.
Stockton, Texas, 29th.
Yuma, Arizona, 7th, 8th, 19th, 20th.
La Mesilla, New Mexico, 22d.
El Paso, Texas, 22d, 28th.
Umatilla, Oregon, 1st, 25th, 27th, 28th, 29th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 187 stations show 5,709 observations to have been made, of which 33 were reported doubtful; of the remainder, 5,676, there were 4,646, or 81.8 per cent., followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

DATE—July, 1882.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 6 p. m.	0	0	2	10	0	0	5	35‡	
3, 2 p. m.	0	5	0	0	0	0	5	40‡	
5, 4 p. m.	0	0	.....	.....	0	0	3	25‡	
6, 3 p. m.	0	0	0	10‡	0	0	2	12	
7, 3 p. m.	0	0	1	7	0	0	1	5	
9, 6 p. m.	0	0	1	5	0	0	0	0	
10, 3 p. m.	2	15‡	0	0	0	0	2	15‡	
11, 4 p. m.	0	15‡	1	1	0	0	1	30‡	Many of the spots small.
12, 3 p. m.	0	0	0	0	0	0	1	25‡	Many of the spots small.
13, 3 p. m.	1	5	0	0	1	5	2	30‡	Many of the spots small.
14, 3 p. m.	1	15	0	5	0	5	3	40‡	Many of the spots small.
15, 3 p. m.	1	10	0	5	0	5	4	45‡	Many of the spots small.
17, 3 p. m.	1	15	1	15	1	10	4	35‡	Many of the spots small.
19, 3 p. m.	0	0	0	0	0	0	4	35‡	
20, 3 p. m.	0	0	0	0	0	0	4	35‡	One of spots very large.
22, 3 p. m.	2	10	0	5	2	10	6	40‡	
24, 3 p. m.	0	0	0	5	0	0	4	25‡	
25, 4 p. m.	0	0	0	0	0	0	3	25‡	
26, 2 p. m.	0	0	1	5	0	0	2	20‡	
27, 8 a. m.	1	5	0	0	1	5	3	25‡	
28, 7 a. m.	0	10	0	5	0	5	3	30‡	
29, 11 a. m.	0	0	1	5	0	0	1	15‡	
31, 5 p. m.	1	10	0	0	0	0	2	25‡	

‡Approximated. Faculæ were seen at the time of every observation.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports: Sun-spots were observed on all clear days during the month. They were most numerous on the 1st; largest and most active from the 15th to 18th; and smallest at the close of the month.

Mr. David Trowbridge, at Waterburg, New York, reports: 1st, five groups, eight spots; one new group has appeared by rotation. 2d, two groups, four spots. 3d, four groups, twelve spots; one group has disappeared by rotation. 7th, one group, two spots; faculæ in the east. 8th, one group, two spots; faculæ in the west. 11th, one group, seven spots. 12th, one group, nine spots, (the same group as the 11th.) 13th, one group, two spots; somewhat cloudy. 14th, three groups, ten spots; one large new group just appeared by rotation. 15th, four groups, thirteen spots; one group has arisen since the morning of the 14th. 16th, four groups, (same as 15th,) eleven spots. 17th, two groups, six spots; a large new group, having five spots and a faint spot in the midst of faculæ, is situated near the east margin. Two of the faint groups of the 16th have disappeared. 20th, three groups, eight spots; faculæ. 21st, four groups, nine spots; faculæ. 22d, four groups, nine spots, (same group as 21st;) faculæ. 25th, two groups, six spots; faculæ. 26th, two groups, seven spots; all faint; faculæ numerous. 27th, three groups, seven spots; one new group appeared by rotation; faculæ. 29th, one group, six spots. 30th, one group, five spots, (same as 29th).

The following record of observations has been forwarded by Mr. A. S. Bender, of Sacramento, California:

DATE—July, 1882.	No. of new		Disappeared by rotation		Disappeared by rotation.		Total No. of		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 4 p. m.	.....	.....	.....	.....	.....	.....	5	25*	
2, 4 p. m.	.....	.....	1	5*	.....	.....	4	25*	No. of spots increased.
3, 4 p. m.	.....	.....	.....	.....	.....	.....	3	35*	" " "
5, 4 p. m.	.....	.....	1	5*	.....	.....	2	30*	Much change in appearance of spots.
7, 4 p. m.	.....	.....	1	10	.....	.....	1	15*	
8, 4 p. m.	.....	.....	1	.....	.....	.....	.....	.....	
10, 4 p. m.	1	20*	.....	.....	.....	.....	1	20*	Many spots very dim.
13, 4 p. m.	1	5*	.....	.....	.....	.....	2	25*	
14, 4 p. m.	1	10*	.....	.....	.....	.....	3	35*	
17, 4 p. m.	.....	.....	1	10*	.....	.....	1	20*	
20, 4 p. m.	2	20*	.....	.....	.....	.....	3	25*	
25, 4 p. m.	.....	.....	1	5	.....	.....	2	20*	
30, 4 p. m.	.....	.....	.....	.....	.....	.....	1	45*	
31, 4 p. m	.....	.....	.....	.....	.....	.....	1	45*	

* Estimated.

METEORS.

New York, 15th: A brilliant meteor was observed at 11:15 p. m., moving horizontally from south to north. It was of a bright bluish color, and left behind it a bright track. The duration of its passage was about twenty seconds.

Goldsboro, North Carolina, 1st: A remarkable meteor was observed in the southern heavens about 10:00 p. m. Its disappearance was succeeded by a noise resembling that of a train in motion, as faintly heard in the distance. The following reports probably indicate that the same meteor was observed at Kinston and New Berne, towns lying southeast of Goldsboro, in this state, and distant about twenty-five and fifty-five miles, respectively:

Kinston, 1st: A terrific meteoric explosion occurred between 8:00 and 9:00 p. m., jarring the windows of the houses and lighting up the streets of the town; duration about one second.

New Berne, 1st: A bright meteor was seen about 9:30 p. m., producing a light brighter than that of the moon. A few minutes after its disappearance, a loud report was heard, resembling somewhat that of a cannon. The course of the meteor was nearly south.

Sandford, Florida, 17th: During the evening a brilliant meteor shot across the heavens from south to north. It passed slowly in a direct line, apparently parallel with the earth, and finally disappeared beneath the horizon. The meteor resembled a ball of fire, at white heat, apparently about six inches in diameter, with a luminous tail about six feet in length, varying from a white flame to a dark brick-red. The duration of its flight was about twenty seconds.

The following report of a meteor, as seen by Captain A. J. McGonnigle, U. S. Army, at Whipple Barracks, Arizona, on the evening of July 9th, has been received:

"When first observed, (about 7:50 p. m.,) the meteor exhibited the appearance of a bright ball of fire, and seemed fully as large as Venus. As it flashed in sight, it fell rapidly, noiselessly and in a perpendicular line, until it reached nearly the verge of the horizon, as bounded by the mountains to the northwest, when it disappeared as suddenly as it appeared, leaving its whole course clearly defined by a straight, bright, glittering line of light. In a few moments, the lower half of this line appeared to drift westward and rapidly assume a serpentine shape, which was plainly discernible for at least ten minutes. Subsequently, and after the serpentine form faded from view, the spot where the meteor was first observed was indicated in the twilight by what appeared to be a small fleecy cloud."

Topeka, Kansas, 5th: At 9:30 p. m., a very brilliant meteor was observed in the western sky. It started from a point near the tail of Leo, and moved toward the horizon. It was apparently about ten times as large as Jupiter, and was of a yellowish green color.

Fall River, Massachusetts, 28th: At 2:30 a. m., a very bright meteor was observed, which left behind it a bright train, and exploded, lighting up the streets.